

L6 Assessment 1 Revision Questions

1.

(i) Find the discriminant of $kx^2 - 4x + k$ in terms of k . [2]

(ii) The quadratic equation $kx^2 - 4x + k = 0$ has equal roots. Find the possible values of k . [3]

2.

The quadratic equation $kx^2 - 30x + 25k = 0$ has equal roots. Find the possible values of k . [4]

3.

The quadratic curves with equations

$$y = x^2 - 4x + 5 \quad \text{and} \quad y = m + 2x - x^2,$$

where m is a constant, touch each other at the point P .

Determine the coordinates of P .

4.

Sketch the graph of the curve with equation

$$y = x^2 - 2x - 8, \quad x \in \mathbb{R}.$$

The sketch must include the coordinates of ...

- ... all the points where the curve meets the coordinate axes.
- ... the minimum point of the curve.

5.

(i) Sketch the curve $y = 2x^2 - x - 3$, giving the coordinates of all points of intersection with the axes. [4]

(ii) Hence, or otherwise, solve the inequality $2x^2 - x - 3 > 0$. [2]

(iii) Given that the equation $2x^2 - x - 3 = k$ has no real roots, find the set of possible values of the constant k . [3]

6.

$$f(x) = (x - 4 - \sqrt{3})(x - 4 + \sqrt{3}), \quad x \in \mathbb{R}.$$

a) Express $f(x)$ in the form ...

i. ... $f(x) = x^2 + bx + c$, where b and c are constants.

ii. ... $f(x) = (x + B)^2 + C$, where B and C are constants.

b) Sketch the graph of the curve C with equation $y = f(x)$.

The sketch must include the coordinates of any points where the graph of C meets the coordinate axes, and the coordinates of the minimum point of C .

7.

$$f(x) = x^2 - 2x - 47, \quad x \in \mathbb{R}.$$

a) Express $f(x)$ in the form $f(x) = (x + a)^2 + b$, where a and b are constants.

b) Solve the equation $f(x) = 0$, giving the answers in exact form in terms of $\sqrt{3}$.

c) Sketch the graph of $f(x)$.

The sketch must include the coordinates of any points where the graph of $f(x)$ meets the coordinate axes, and the coordinates of the minimum point of $f(x)$.

8.

$$f(x) = 4x^2 + 4x - 1, \quad x \in \mathbb{R}.$$

a) Express $f(x)$ in completed the square form.

b) Hence find, as exact surds, the roots of the equation $f(x) = 0$.

9.

Solve the equation $x^{\frac{2}{3}} + 3x^{\frac{1}{3}} - 10 = 0$.

10.

Solve the equation $2x - 7x^{\frac{1}{2}} + 3 = 0$.

11.

Solve the equation $3x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$.

12.

Solve the following equation

$$\frac{x}{x-2} + 4 = \frac{3}{x}, \quad x \neq 0.$$

13.

Solve the following equation

$$\frac{2}{x-3} + \frac{13}{x^2+4x-21} = 1, \quad x \neq 3, \quad x \neq 7.$$

14.

Find, in exact surd form, the roots of the equation

$$\frac{x^2+3x}{x^2+5x+6} = \frac{2x^2-x-1}{x^2+8x-9}, \quad x \neq -3, \quad x \neq 1.$$

15.

Simplify fully

$$\frac{\sqrt{9x^6y^4}}{(3x^2y^3)^2}.$$

16.

Simplify fully the following expression

$$\sqrt{\frac{3a^3bc \times 6a^2b^2c^3}{2abc^4}}.$$

17.

Simplify fully the following expression

$$\left(k^{\frac{3}{2}} \times 8k^{-3}\right)^{\frac{1}{3}}.$$

18.

a Given that $243\sqrt{3} = 3^a$, find the value of a .

b Given further that $3^x \times 27^y = 243\sqrt{3}$, express y as a function of x .

19.

Express

$$\frac{\sqrt{98} - \sqrt{8}}{1 + \sqrt{2}},$$

in the form $a + b\sqrt{2}$, where a and b are integers.

20.

A rectangle has area 12 cm^2 and length $2 + \sqrt{7}$ cm.

Find its width in the form $a + b\sqrt{7}$, where a and b are integers.

21.

a) $\sqrt{50} + \sqrt{3} \times \sqrt{6} - \frac{14}{\sqrt{2}}.$

b) $(\sqrt{75} - \sqrt{48})^2.$